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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/781,813	02/20/2004	Tutomu Ikeda	04022	3953

23338 7590 08/29/2006

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EXAMINER
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WHITTINGTON, KENNETH

ART UNIT	PAPER NUMBER
2862	

DATE MAILED: 08/29/2006

Please find below and/or attached an Office communication concerning this application or proceeding.



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**DETAILED ACTION**

The Amendment filed July 21, 2006 has been entered and considered.

***Claim Rejections - 35 USC § 102***

6           The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

          Claims 1-3, 11 and 12 are rejected under 35 U.S.C. 102(e) as being anticipated by Schroeder et al. (US 6,614,223), hereinafter Schroeder. Regarding claims 1-3, Schroeder discloses a rotary position sensor comprising:

12           a magnet support (See Schroeder FIG. 4, item 114);

          at least two magnets made of ferrite based materials attached to the magnet support symmetrically arranged about the center of rotation, so that the magnets produce a uniform magnetic field across a center of rotation, wherein the magnets have opposite end portions in a circumferential direction about  
18 a center of rotation, and wherein the magnets are spaced from each other in the circumferential direction by gaps (See FIG. 4, items 112 and note field emanating therefrom and col. 4, lines 45-61, note also that the ring is made of two magnets and magnetic material, the magnets separated from each other by gaps between them and gaps in the circumferential direction);

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a sensor disposed within the magnetic field on or near the center of rotation and arranged and constructed to detect a change of direction of the magnetic field as the magnets and sensor rotate relative to each other (See FIG. 4, item 12);

wherein the sensor outputs signals representing a relative rotational angle (See col. 2, lines 22-28).

Regarding claim 11, Schroeder discloses the magnets extending along an angle measured about the center of rotation, and wherein the angle is determined such that an error of the output signal from the sensor due to an offset of a location of the sensor away from the center of rotation is less than a predetermined value (See col. 2, lines 5-19 and col. 4, line 62 to col. 5, line 27, note that to overcome the error associated with the offset from center sensor, a uniform field must be created between the magnets in the region of the sensor, such field encompasses the sensor body in both a center position or offset therefrom).

Regarding claim 12, Schroeder discloses the angle is determined based on factors comprising a maximum offset distance tolerance of the sensor from the center of rotation, the material of the magnets, and a thickness of each of the magnets in a radial direction about the center of rotation (See col. 4, line 62 to col. 6, line 20, note the shape and thickness factor

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into the uniform field formation, the magnetization factors into the field formation, and the offset to which the disclosure of Schroeder is concerned is compensated by creating a uniform field covering the sensor in a maximum offset position).

6           Claims 16, 17, 19-22 and 25-29 are rejected under 35 U.S.C. 102(e) as being anticipated by Hamaoka et al. (US 6,356,073), hereinafter Hamaoka I. Regarding claims 16, 20, 27 and 28, Hamaoka I discloses a rotary position sensor comprising:

12           a magnet support structured as a circle and having an inner radial surface and outer surface (See Hamaoka I FIGS. 6-7, items 24 and 29);

18           a first and second magnet attached to inner surface of the magnet support symmetrically arranged about the center of rotation, so that the magnets produce magnetic field across a center of rotation, wherein the first and second magnet each have a pair of opposing end portions, the opposing end portions of the first magnet being separate from the opposing end portion of the second magnet by a gap and the magnets outer surface is attached to the support radial inner surface (See FIGS. 6-7, items 39 and col. 3, lines 9-42);

          a sensor disposed within the magnetic field and arranged and constructed to detect a change of direction of the magnetic

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field as the magnets and sensor rotate relative to each other  
(See FIGS. 6-7, item 31, see also col. 1, line 16 to col. 2,  
line 10);

wherein the sensor outputs signals representing a relative  
rotational angle (See col. 3, line 50 to col. 4, line 28).

6        Regarding claim 17, Hamaoka I discloses the magnets  
symmetrically positioned with each other and the sensor is  
positioned substantially in the center of rotation (See FIGS. 6-  
7, item 31).

12        Regarding claim 19, Hamaoka I discloses the magnets having  
opposite end surfaces along the circumferential direction, and  
wherein each of the end surfaces is substantially orthogonal to  
an outer circumferential surface of each of the magnets (See  
FIGS. 6-7, items 39).

18        Regarding claims 21 and 22, Hamaoka I discloses the end  
portions of the magnets have predetermined configuration, the  
configuration based on a central angle about the center of  
rotation between the opposite ends of each of the magnets (See  
FIGS. 6-7, items 39).

Regarding claims 25 and 26, Hamaoka I discloses a yoke  
portion is positioned between the inner radial surface of the  
magnet support and the outer surface of the magnet along the  
entire inner radial surface (See FIGS. 6-7, item 24, note that

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if the magnet support is interpreted as item 29, the yoke would be item 24).

Regarding claim 29, Hamaoka I discloses the magnets having arc-shaped configurations along the radial direction of the magnet support.

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Claims 16-18, 20, 21, 23 and 24 are rejected under 35 U.S.C. 102(e) as being anticipated by Hamaoka et al. (US 6,483,296), hereinafter Hamaoka II.

Regarding claims 16 and 20, Hamaoka II discloses a rotary position sensor comprising:

12 a magnet support structured as a circle and having an inner radial surface and outer surface (See Hamaoka II FIGS. 18-22, particularly FIGS. 21A-21C items 24 and 29);

a first and second magnets attached to inner surface of the magnet support symmetrically arranged about the center of rotation, so that the magnets produce magnetic field across a center of rotation, wherein the first and second magnet each have a pair of opposing end portions, the opposing end portions of the first magnet being separate from the opposing end portion of the second magnet by a gap and the magnets outer surface is attached to the support radial inner surface (See FIGS. 21A-21C, items 145 and 146);

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a sensor disposed within the magnetic field and arranged and constructed to detect a change of direction of the magnetic field as the magnets and sensor rotate relative to each other (See FIGS. 21A-21C, item 31, see also col. 15, line 31 to col. 16, line 57);

6 wherein the sensor outputs signals representing a relative rotational angle (See col. 15, line 31 to col. 16, line 57 and see FIGS. 23A, 23B and 24).

Regarding claim 17, Hamaoka II discloses the magnets symmetrically positioned with each other and the sensor is positioned substantially in the center of rotation (See FIGS. 12 21A-21C, items 145, 146 and 31, note the either one of the sensors is substantially at the center of rotation).

Regarding claim 18, Hamaoka II discloses each of the opposite end portions comprising a first and second surface that intersect with each other and are respectively inclined related to an inner circumferential and an outer circumferential surface 18 of each of the magnets by obtuse angles (See FIGS. 21A-21C, note magnet end portions of items 145 and 146).

Regarding claims 21, 23 and 24, Hamaoka II discloses the end portions of the magnets having configurations and are defined such that surfaces are substantially perpendicular and parallel to the direction of the magnetic field that extends

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across the center of rotation (See FIGS. 21A-21C, note end portions of magnets 145 and 146).

***Claim Rejections - 35 USC § 103***

The text of those sections of Title 35, U.S. Code not  
6 included in this action can be found in a prior Office action.

Claims 1-11 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hamaoka I in view of Ooki et al. (US 2002/0121894), hereinafter Ooki.

Regarding claim 1, Hamaoka I teaches a rotary position sensor comprising:

12 a magnet support (See Hamaoka I FIGS. 6-7, items 24 and 29);

at least two magnets attached to the magnet support symmetrically arranged about the center of rotation, so that the magnets produce a uniform magnetic field across a center of rotation, wherein the magnets have opposite end portions in a  
18 circumferential direction about the center of rotation, and wherein the magnets are spaced from each other in the circumferential direction by gaps (See FIGS. 6-7, items 39 and col. 3, lines 9-42);

a sensor disposed within the magnetic field and arranged and constructed to detect a change of direction of the magnetic

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field as the magnets and sensor rotate relative to each other  
(See FIGS. 6-7, item 31);

wherein the sensor outputs signals representing a relative  
rotational angle (See col. 3, line 50 to col. 4, line 28, see  
also col. 1, line 16 to col. 2, line 10).

6        However, Hamaoka I does not specifically disclose the  
material for the magnets. Ooki teaches using ferrite-based  
magnets in rotary position sensors wherein the magnets are  
located on opposite sides of the sensor and rotate with respect  
thereto (See Ooki FIGS. 1-3, items 4 and 5 and see paragraph  
0030). It would have been obvious at the time the invention was  
12        made to use ferrite magnets in the sensor assembly of Hamaoka I.  
One having ordinary skill in the art would have been motivated  
to do so to provide an economical magnet assembly and reduce the  
cost of the sensor assembly (See Ooki paragraph 0030).

      Regarding claim 2, the noted combination teaches the at  
least two magnets are disposed substantially symmetrically with  
18        respect to the center of rotation (See Hamaoka I FIGS. 6-7,  
items 39).

      Regarding claim 3, the noted combination teaches the sensor  
is positioned substantially at the center of rotation (See  
Hamaoka I FIGS. 6-7, item 31).

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Regarding claim 4, the noted combination teaches the magnet support comprises a substantially tubular member, and the at least two magnets are attached to an inner peripheral surface of the tubular member, and the substantially tubular member has a central axis along the center of rotation (See Hamaoka I FIGS.

6 6-7, items 24, 29 and 39).

Regarding claim 5, the noted combination teaches the magnets are magnetized to produce a substantially uniform magnetic field that intersects the sensor, and wherein the substantially uniform magnetic field can be represented by substantially parallel, unidirectional, magnetic field lines intersecting the sensor (See Hamaoka I FIGS. 6-7, note the polarity of the magnets would produce parallel lines through the space between them).

Regarding claim 6, 7, 8, 9 and 10, the noted combination teaches each of the magnets has an arc-shaped configuration along a circumferential direction of the tubular member, the magnets have a uniform thickness in the radial direction of the tubular member, have opposite ends along the circumferential direction, the end surfaces on the inner side of the tubular member, and the end surfaces comprises a first surface and a second surface that are respectively substantially aligned with a direction of the magnetic field and substantially aligned

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perpendicular to the direction of the magnetic field (See Hamaoka I FIGS. 6-7, items 39).

Regarding claim 11, the noted combination teaches the magnets extend along an angle measured about the center of rotation, determined such that an error is less than a  
6 predetermined value (See Hamaoka I FIGS. 6-7, note that the magnets are formed to create a uniform magnetic field therebetween, see col. 3, lines 10-42, which has the effect of reducing error associated with off center locations of the sensor).

Regarding claim 15, the noted combination teaches the Hall  
12 IC in the embodiments can be exchanged with a magneto resistance element (See Hamaoka I col. 8, lines 45-55).

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schroeder. Regarding this claim, it is noted that Schroeder is concerned with making a uniform field between  
18 the magnets so that if the sensor at a specific offset from the center of rotation, it will still be in the uniform field and the errors associated therewith will be compensated. However, Schroeder does not disclose any particular offset distance. Nonetheless, it would have been obvious at the time the invention was made to use the recited dimension for the offset

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because where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. See MPEP

2144.05II(A). Furthermore, modifying Schroeder such the maximum offset has the relative dimensions recited in the claim would be

6 obvious to one having ordinary skill in the art through routine experimentation because where the where the only difference

between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having

the claimed relative dimensions would not perform differently than the prior art device, the claimed device is not patentably

12 distinct from the prior art device. See *Gardner v. TEC Systems, Inc.*, 220 USPQ 777 (Fed. Cir. 1984), *cert. denied*, 225 USPQ 232

(1984). One having ordinary skill to modify Schroeder as noted would be motivated to do so to allow for off center placement of the sensor while still maintaining accurate rotational

measurements, the offset being determined based on the needed

18 requirements of the sensor assembly.

#### ***Response to Arguments***

Applicants' arguments filed July 21, 2006 have been fully considered but they are not persuasive.

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Regarding the rejections applying the Hamaoka I reference, the first argument asserted by Applicants is that Hamaoka I does not teach a sensor arranged to detect a change of direction of the magnetic field during sensor rotation (See page 9 of the Remarks). However, this is precisely what Hamaoka I discloses.

6 Hamaoka discloses determining the rotational position of a rotor comprising the magnets and magnet supports (See FIGS. 6-7, items 39, 24 and 29) with respect to a stator core comprising flux guides and a sensor (See FIGS. 6-7, items 25 and 31), the rotation of the magnets changing the magnetic flux through the sensor to determine the rotational position (See FIG. 4 and  
12 disclosure related thereto). This sensor is incorporated into a throttle sensor to determine the angular position of a rotary shaft (See FIG. 1 and disclosure related thereto).

Applicant second argument is that Hamaoka I does not disclose two magnets separated by a gap (See page 10 of Remarks). However, FIGS. 6 and 7 of Hamaoka I each disclose a  
18 pair of magnets 39 separated by both a gap directly between them and by a circumferential gap. Accordingly, Hamaoka I discloses this feature as well.

Regarding the rejections applying the Schroeder reference, the only argument asserted by Applicants is that because the magnets are integral with the shell, they cannot be spaced from

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each other (See page 10 of the Remarks). However, this assertion ignores the disclosure and structure shown in Schroeder. For instance, Schroeder explicitly states each magnet is separate by a gap (See Schroeder col. 4, lines 38-44). Furthermore, in FIG. 4, which is relied upon for the rejection, a ferrite ring (item 102) has portions that are magnetized to form "two separate, symmetrically disposed, mutually attracting magnets" (See Schroeder col. 4, lines 12-34 and FIG. 4, note magnets 116 and 118). The fact that the two separate magnets are integrated with the un-magnetized portions of the ring does not preclude the fact they are separate magnets. Accordingly, Schroeder discloses this feature.

Because of the forgoing response to Applicants' arguments, the rejections and/or amended versions thereof stand.

### **Conclusion**

Applicants' substantial amendments to the claims necessitated the new and/or amended grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this

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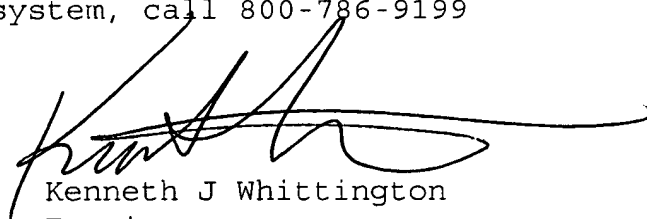
action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any  
6 extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kenneth  
12 J. Whittington whose telephone number is (571) 272-2264. The examiner can normally be reached on Monday-Friday, 7:30am-4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Lefkowitz can be reached on (571) 272-2180. The fax phone number for the  
18 organization where this application or proceeding is assigned is 571-273-8300.

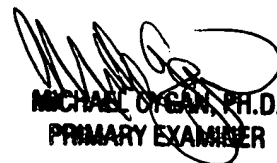
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Kenneth J Whittington  
Examiner  
Art Unit 2862

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